CLAIMS

1. A method of communicating with an electronic device, comprising:

providing a computer having an audible sound receiving and generating sub-system including a microphone;

transmitting from a source at least one ultrasonic acoustic signal, encoded with information to the computer; and

receiving said at least one signal by said microphone, to be detected by said computer.

2. A method of communicating with an electronic device, comprising:

providing a computer having an audible sound receiving and generating sub-system including a microphone and a loudspeaker;

transmitting from a source at least one first acoustic signal, encoded with information to the computer;

receiving said at least one signal by said microphone, to be detected by said computer; and

transmitting to said source, using said loudspeaker, at least a second acoustic signal, encoded with information, in response with said detected signal.

3. A method according to claim 2, wherein at least one of said at least one first signal and at least a second signal comprise an ultrasonic signal.

4. A method of communicating with an electronic device, comprising:

providing an electronic device having a sound receiving and generating sub-system including a microphone and a loudspeaker;

transmitting from a source at least one ultrasonic acoustic signal, encoded with information, to the electronic device;

receiving said at least one signal by said microphone, to be detected by said electronic device; and

transmitting to said source, using said loudspeaker, at least a second ultrasonic acoustic signal, encoded with information, in response with said detected signal.

5. A method according to claim 4, wherein said electronic device comprises a computer.

6. A method of communicating with an electronic device, comprising:

providing a telephone having a sound receiving and generating sub-system including a microphone;

transmitting from a source at least one acoustic signal, encoded with information to the telephone; and

receiving said at least one signal by said microphone, to be used to control said telephone.

7. A method according to claim 6, wherein said acoustic signal comprises an ultrasonic signal.

8. A method of communicating with an electronic device, comprising:

providing a computer having a sound receiving and generating sub-system including a microphone;

transmitting from a source at least one acoustic signal, encoded with information to the computer; and

receiving said at least one signal by said microphone; and

forwarding an indication of said information to a remote computer, over an Internet.

9. A method according to claim 8, wherein said indication comprises a sound file.

10. A method according to claim 8, wherein said indication comprises a data file.

11. A method according to any of claims 8-10, wherein said acoustic signal comprises an ultrasonic signal.

12. A method according to any of claims 1,2,3,5 or 8-10, wherein said computer comprises a PDA, personal digital assistant.

13. A method according to any of claims 1,2,3,5 or 8-10, wherein said computer comprises a portable computer.

14. A method according to any of claims 1,2,3,5 or 8-10, wherein said computer comprises a desk-top computer.

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15. A method according to any of claims 1,2,3,5 or 8-10, comprising processing said at least one sound by said computer.

16. A method according to claim 15, wherein processing comprises extracting said encoded information.

17. A method according to claim 15, wherein said processing comprises determining a distance between said microphone and said source.

18. A method according to claim 15, wherein said processing comprises determining movement of said microphone relative to said source.

19. A method according to claim 18 wherein said movement comprises angular movement.

20. A method according to claim 18, wherein said movement comprises translation.

21. A method according to claim 15, wherein said processing comprises determining a spatial position of said microphone relative to said source.

22. A method according to claim 21, wherein said spatial position is a one-dimensional spatial position.

23. A method according to claim 21, wherein said spatial position is a two-dimensional spatial position.

24. A method according to claim 21, wherein said spatial position is a three-dimensional spatial position.

25. A method according to claim 15, wherein said processing comprises emulating a touch screen using said received at least one sound.

26. A method according to claim 15, wherein said processing comprises emulating a pointing device using said received at least one sound.

27. A method according to claim 15, comprising controlling at least one action of a toy, responsive to said received at least one sound.

28. A method according to claim 5 or claim 6, wherein said electronic device comprises a wireless communication device.

29. A method according to claim 4, wherein said electronic device comprises a computer peripheral.

30. A method according to claim 29, wherein said peripheral comprises a printer.

31. A method according to claim 4, wherein said device comprises a toy.

32. A method according to any of claims 1-10 or 31, wherein said information comprises programming information.

33. A method according to claim 31, wherein said information comprises music.

34. A method according to any of claims 1-10, wherein said source comprises a toy.

35. A method according to claim 34, wherein said information comprises stored player input.

36. A method according to any of claims 1-10, wherein said source comprises a smart card.

37. A method according to any of claims 1-10, wherein said source comprises a wireless communication device.

38. A method according to any of claims 1-10, wherein said source comprises a computer.

39. A method according to any of claims 1-10, wherein said source comprises a computer peripheral.

40. A method according to any of claims 1-10, wherein said information comprises personal information.

41. A method according to any of claims 1-10, comprising logging into a computer system responsive to said at least transmitted signal.

42. A method according to any of claims 1 or 6-10, comprising transmitting at least a second acoustical signal responsive to said received at least one signal.

43. A method according to any of claims 2 or 5-10, wherein said acoustic signal comprises human audible sound.

44. A method according to claim 43, wherein said sound has a main frequency over 10kHz.

45. A method according to any of claims 2 or 5-10, wherein said sound has a main frequency which is infra-sonic.

46. A method according to any of claims 1-10, wherein said information is encoded using below human-threshold amplitude signals.

47. A method according to any of claims 1-10, wherein said information is encoded using below human-threshold amplitude variations.

48. A method according to any of claims 1-10, wherein said sound is generated at a frequency outside a normal operating frequency for said sound subsystem.

49. A method according to any of claims 1-10, wherein said sound subsystem is designed for generating musical sounds.

50. A method according to any of claims 1-10, wherein said sound subsystem comprises a sound card.

51. A method according to claim 50, wherein said sound card comprises a SoundBlaster compatible sound card.

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52. A method according to any of claims 1-10, wherein said sound sub-system is designed for audible sound communication with a human operator.

53. A method according to any of claims 1, 3 or 4, wherein said ultrasonic signal has a main frequency below 50kHz.

54. A method according to any of claims 1, 3 or 4, wherein said ultrasonic signal has a main frequency below 35kHz.

55. A method according to any of claims 1, 3 or 4, wherein said ultrasonic signal has a main frequency below 25kHz.

56. A method according to any of claims 1, 3 or 4, wherein said ultrasonic signal has a main frequency of about 21kHz.

57. A method according to any of claims 1, 3 or 4, wherein said ultrasonic signal has a main frequency of about 20kHz.

58. A method according to any of claims 1, 3 or 4, wherein said ultrasonic signal has a main frequency of about 19kHz.

59. A method according to any of claims 1, 3 or 4, wherein said ultrasonic signal has a main frequency of below 18kHz.

60. A method of creating a smart card terminal, comprising:

providing a general purpose computer having a general-purpose sound sub-system; and

loading a smart-card terminal software on said computer,

wherein said software controls said sound system to receive acoustic waves from a smart card and transmit acoustic waves to the smart card.

61. A method according to claim 60, wherein said software analyses said received acoustic waves to determine information encoded by said acoustic waves.

62. A method according to claim 60, wherein said software retransmits said acoustic waves to a remote computer which analyses said received acoustic waves to determine information encoded by said acoustic waves.

63. A method according to any of claims 60-62, wherein loading a smart-card terminal software comprises downloading the software over an Internet.

64. A method according to any of claims 60-62, wherein said acoustic waves comprise ultrasonic waves.

65. A method according to any of claims 60-62, wherein said smart-card comprises a memory for storing a monetary balance.

66. A method according to any of claims 60-62, wherein said software encrypts information encoded by said transmitted acoustic waves.

67. A method according to any of claims 60-62, wherein said smart card comprises a memory for storing identification information for a card owner.

68. A method according to any of claims 60-62, wherein said smart card comprises a processor for analyzing information received from said computer and for generating a response to said computer.

69. A computer system comprises:

a processor;

a sound sub-system, designed for generating music, comprising:

a speaker which generates acoustic waves; and

a microphone which detects acoustic waves;

a memory; and

a software installed in said memory, wherein said software analyses acoustic waves received by said microphone to recognize information encoded by said acoustic waves and wherein said software uses said speaker to transmit information encoding acoustic waves responsive to said recognized information.

70. A computer according to claim 69, wherein said acoustic waves comprise ultrasonic acoustic waves.

71. A method of attaching a peripheral to a computer, comprising:

providing a general purpose computer including a sound generating and receiving subsystem;

analyzing, at said computer, sounds received by said subsystem to detect acoustic transmissions from said peripheral; and

transmitting, from said computer and using said subsystem, information to said peripheral using encoded sound transmissions.

72. A method of communicating with a computer, comprising:

generating by a computer an electromagnetic field by driving a computer component not designed for field generation in a manner which generates a parasitic electromagnetic field, wherein said field is encoded with information by said generation; and

receiving said encoded field by an electronic device.

73. A method according to claim 72, wherein said electronic device receives said wave using an RF antenna.

74. A method according to claim 72, wherein said electronic device receives said wave using a microphone.

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75. A method according to any of claims 72-74, wherein said computer component comprises a speaker.

76. A method according to any of claims 72-74, wherein said electromagnetic field has a main AC frequency of between 10 kHz and 100 kHz.

77. A method of detecting electromagnetic radiation by a computer comprising:

generating an electro magnetic field which encodes information;

sampling a microphone channel associated with said computer to detect artifacts caused by said field; and

decoding said information by said computer.

78. A method according to claim 77, wherein said associated computer is physically connected to said microphone channel.

79. A method according to claim 77, wherein said associated computer is connected to said microphone channel by a computer network connection.

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80. A method according to any of claims 77-79, wherein said electromagnetic field is a side-effect of driving a speaker.

81. A method according to any of claims 77-79, wherein said electromagnetic field is a side-effect of driving a speaker.

82. A method according to any of claims 77-79, wherein said electromagnetic field has a main AC frequency of between 10 kHz and 100 kHz.

83. A method of emulating a microphone using a speaker, comprising:
providing a computer having a speaker channel and a microphone channel;
coupling a computer speaker to the microphone channel; and
receiving signals for said microphone channel via said speaker.

84. A method according to claim 83, wherein coupling comprises coupling using a coupler.

85. A coupler for an audio channel, comprising:
a first connector for selectively driving a speaker or receiving input from a microphone;
a second connector for sending signals to a microphone channel;
a third connector for receiving speaker-driving signals from a speaker channel; and
circuitry for selectively driving said speaker or receiving signals from said microphone, using said first connector.

86. A coupler according to claim 85, wherein said circuitry receives switching instructions via said speaker channel.

87. A method of determining a status of an electronic device, comprising:

receiving information encoding acoustic signals generated by said device; and

analyzing said signals to determine an operational status associated with said device responsive to said information.

88. A method according to claim 87, wherein said status comprises a status of said device.

89. A method according to claim 87, wherein said status comprises a status of a second device attached by computer communications with said device.

90. A method according to claim 87, wherein said status comprises a status of a network that said device is part of.

91. A method according to any of claims 87-90, wherein said analyzing comprises analyzing on a computer separate from a circuitry used for acquiring said signals.

92. A method according to any of claims 87-90, wherein said signals are generated by said device responsive to an interrogation by a second device which performs said receiving.

93. A method according to claim 92, wherein said interrogation does not interrupt other activities of said device.

94. A method according to any of claims 87-90, wherein said signals are generated by said device independent of an interrogation by a second device.

95. A method according to any of claims 87-90, wherein said signals are sonic.

96. A method according to any of claims 87-90, wherein said signals are ultrasonic.

97. A method according to any of claims 87-90, comprising programming an existing device to generate said signals using an existing speaker which, when the device was designed, was not designated for communication with a second device.

98. A method according to claim 97, wherein said programming comprises software programming in which only memory storage locations are modified.

99. A method according to claim 97, wherein said programming comprises hardware programming in which electronic circuitry of the device is modified.

100. A method according to any of claims 87-90, wherein said electronic device comprises a computer.

101. A method according to any of claims 87-90, wherein said electronic device comprises a network hub.

102. A method according to any of claims 87-90, wherein said electronic device comprises a network switch.

103. A method according to any of claims 87-90, wherein said electronic device comprises a network router.

104. A method of accessing a single user computer by a second user, without interrupting the activities of the first user, comprising:

transmitting an acoustically encoded command by the second user to the computer;

receiving said command by the computer; and

executing the command by the computer.

105. A method according to claim 104, wherein said command is ultrasonically encoded.

106. A method according to claim 104 or claim 105, wherein said receiving comprises receiving using a microphone connected to a sound card of said computer, which sound card is designed for audio applications.

107. A computer networking method comprising:

providing first, second and third computers; and

transmitting a message encoding data from the first computer to the third computer via the second computer by acoustic transmission between the computers.

108. A method according to claim 107, wherein said acoustic transmissions utilize sound cards designed specifically for processing audible sounds.

109. A method according to claim 107, wherein said acoustic transmissions utilize are ultrasonic having a frequency of less than 50 kHz.

110. A wireless peripheral for an electronic device, comprising:

a microphone for receiving ultrasonic acoustic transmissions having a frequency of less than 70 kHz from an electronic device;

circuitry for processing said transmission; and

a display for displaying a result of said processing.

111. A peripheral according to claim 110, wherein said peripheral comprises an input element and a speaker for transmitting sound to said electronic device responsive to input from said input element.

112. A peripheral according to claim 110, comprising a printing engine for printing a result of said processing.

113. A peripheral according to any of claims 110-112, wherein said processing comprises merely of converting the signals from an acoustic encoding format to a format suitable for said display.

114. A peripheral according to any of claims 110-112, wherein said processing comprises processing the information encoded by said transmissions.

115. A peripheral according to any of claims 110-112, wherein said electronic device comprises a computer.

116. A peripheral according to any of claims 110-112, wherein said electronic device comprises a radio.

117. A peripheral according to any of claims 110-112, wherein said peripheral comprises a speaker for said electronic device.

118. A peripheral according to any of claims 110-112, wherein said peripheral comprises a time display which presents a time signal generated by said electronic device.

119. A peripheral according to any of claims 110-112, wherein said peripheral comprises a status display which presents a status signal generated by said electronic device.

120. A wireless peripheral for an electronic device, comprising:

a speaker for transmitting ultrasonic acoustic transmissions having a frequency of less than 70 kHz from an electronic device; and

circuitry for generating said transmissions; and

an input element for receiving input to be encoded by said transmissions.

121. A peripheral according to claim 120, comprising a microphone for receiving ultrasonic transmissions from said electronic device.

122. A peripheral according to claim 120 or claim 121, wherein said input element comprises a bar-code reader.

123. A peripheral according to claim 120 or claim 121, wherein said input element comprises a smart card reader.

124. A peripheral according to claim 120 or claim 121, wherein said input element comprises a pointing device.

125. A peripheral according to claim 120 or claim 121, wherein said input element comprises a keyboard.

126. A method of communicating with a computer, comprising:

providing a computer having a data line attached to at least one particular peripheral;

sending a data transmission to the computer by injecting a signal into said data line using an electromagnetic coupler; and

identifying by said computer the source of said data transmission.

127. A method of communicating with a computer, comprising:

providing a computer having a data line attached to at least one particular peripheral;

generating by said computer a data transmission directed to a different peripheral; and

receiving said data transmission from the computer by eavesdropping on said data line using an electromagnetic coupler.

128. A method of injecting data into a computer from an uncoupled peripheral, comprising:
transmitting said data from the uncoupled peripheral to a tap; and
physically activating a peripheral coupled to said computer, by said tap.

129. A method according to claim 128, wherein physically activating comprises activating keys in a keyboard.

130. A method according to claim 128, wherein physically activating comprises activating vibrating a mouse.

131. A method of communicating with a computer, comprising:
generating by a computer a data transmission;
controlling, by said computer, a component not designated for data transmission, to effect a transmission of said data; and
receiving said data transmission from the computer by a second device.

132. A method according to claim 131, wherein said computer controls an activation of a mechanical component of said computer to transmit said data by modulation of mechanical sounds generated by said computer.

133. A method according to claim 131, wherein said computer controls an activation of a status LEDs of said computer to transmit said data by modulation of illumination of said LEDs.

134. A method according to claim 131, wherein said computer controls an activation of an electrical component of said computer to transmit said data by modulation of parasitic RF signals generated by said computer.

135. A method of transmitting data over a computer network, comprising:
providing a sound file at a first location;
transmitting said sound file to a second location via said computer network; and

transmitting said sound file as acoustic sounds to a processor at a third location.

136. A method of transmitting data over a computer network, comprising:

encoding data as acoustic sounds at a first location;

transmitting said sound file to a second location as acoustic sounds; and

transmitting said acoustic sounds as a sound file to a third location, via said network.

SubA18 137. A method according to claim 135 or claim 136, wherein said network comprises an Internet.

138. A method of analyzing acoustic signals, comprising:

receiving said signals using a microphone which microphone converts the signals into analog electrical signals;

driving at least one digital data lead of an integrated circuit using said analog signals; and

processing said signals using said integrated circuit.

139. A method according to claim 138, comprising amplifying said electrical signals prior to said driving.

140. A method of determining a time of flight of a pulse between two electronic devices, comprising:

simultaneously generating an acoustic pulse and an electromagnetic pulse using a speaker of a first electronic device;

detecting, using a single detector associated with a second electronic device, both the acoustic pulse and the electromagnetic pulse; and

determining a time of flight of said acoustic pulse the two devices based on a delay between the reception of the two pulses.

141. A method of acoustic communication, comprising:

estimating an echo duration for an acoustic band; and

transmitting data using the acoustic band, wherein between data elements a period of silence is provided, having a duration responsive to said echo duration.

142. A method according to claim 141, wherein the data elements are encoded using individual frequencies in an FSK encoding protocol.

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143. A method according to claim 141 or claim 142, wherein estimating comprises estimating based on an expected communication geometry.

144. A method according to claim 141 or claim 142, wherein estimating comprises estimating a duration based on at least one acoustic calibration generated adjacent to said data transmission.